

Faculty of Computing and Information Technology

Indus University Karachi

Department of Computing

Final Year Project Proposal Submission Form

Section 1: (To be completed by the Students)

Program of Study: BS(CS) Session: 2020B

BS (CS)/ BS (SE), MS, B.TECH, BE, (Programs)

Project Title: REAL TIME SHOPPING MALL SAFETY AND SECURITY SYSTEM

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1. Abstract

In today's world, everything is becoming smarter, including markets. We propose a smart market and a smart safety and security system as part of our project. This initiative promotes improved market automation. Our solution automates electronic appliances efficiently, provides theft detection and fire alarm systems, and uses sensor data to control room temperature, humidity, and electrical loads with a smart safety and security system. Video surveillance has been shown to be an important component of many organizations' security and safety priorities. This project is about the development of an embedded real-time security system that detects motion from any unknown individual in the camera and alerts market management and security departments of any suspicious activity in the markets.

2. Introduction

The increasing popularity of smart technologies has led to the development of smart markets and smart safety and security systems. These systems are less expensive and more secure than traditional security systems, and they can help to improve market security and prevent fires and other incidents.

One such system is the real-time shopping mall safety and security system. This system consists of three major blocks: sensors, a logic processing unit, and a main system. The sensors collect data about the environment, such as temperature, humidity, and motion. The logic processing unit processes this data and makes decisions about how to respond. The main system then acts, such as sounding an alarm or notifying the fire department.

This system has a number of benefits over traditional security systems. It is more efficient and cost-effective to operate, it is easier to maintain and update, and it provides peace of mind to market owners and customers.

In this thesis, we will present a detailed overview of the real-time shopping mall safety and security system. We will discuss the system's components, its operation, and its benefits. We will also discuss the challenges of implementing such a system and the potential solutions to these challenges.

3. Literature Review/Research Background

In this chapter, we present the project's background and literature study to clarify the preceding problem statement and its working, as well as the approaches they employed to solve such challenges. We also compare the studies that have been conducted on this project. There is a different project linked to our project but we introduced some new features which never been seen before. Real-time Shopping Mall Safety and Security Systems provide comfort to humans during shopping and reduce the time it takes to respond to an emergency. Our system includes aspects that lure people to malls while also ensuring that the mall is safe from robbery and fire. A Wi-Fi-based HAS (Home Automation System) is presented in [2] to control the electrical appliances with a smartphone app. The system is based on Wi-Fi Module ESP8266 which is connected with an Arduino Mega 2560 module. The Relay board is used to control the power of electrical appliances like fans and bulbs. Other sensors placed in the models are a fan, humidity sensor, motion sensor, buzzer, and temperature sensor. A smartphone app controls the off-and-on operations of these sensors in a model house that is a miniature template of a house. Similarly, an Arduino 'HAS' is proposed in [3] that integrates WLAN (Wireless Local Area Network) for controlling the electrical appliances. A smartphone app is available to control the light bulb, fan, motion, and smoke sensors. Similarly, in [4], Various devices are controlled via the system like lights, fans, etc. Besides automation, various systems for surveillance and home security have also been proposed with IoT sensors. [5] The aim of the paper of Priya H. Pande et al is to design a home security and monitoring system. The hardware equipment includes sensors (PIR, Magnetic and LM35 sensor), a microcontroller unit, a relay and a cell phone. When any sensor is triggered, the SMS alarm message will be sent to the homeowner here. In [6] this research paper used many ultrasonic sensors for the detection of

intruders. If someone passes through the sensors, transmission will be blocked and the system knows the situation. A Major Voting Mechanism (MVM) is used to turn on the video camera. provided an ARM-based video surveillance using an embedded remote. The system sends the captured video to the user's mobile through e-mail. Similarly, in [7] the currently built prototype of the system sends alerts to the owner over voice calls using the Internet if any sort of human movement is sensed near the entrance of his house and raises an alarm optionally upon the user's discretion. The provision for sending alert messages to concerned security personnel in case of critical situations is also built into the system. [8] J.J. Padmini developed a system using IoT for power utilization and conservation in smart homes. In this system, they used an image processing system to recognize human activities and designed a home automation system that can control different household devices with the help of Wi-Fi and GSM technology. In this research paper [9] author makes a smart home security system based on Zigbee that protects Sarawakian homeowners against flood, smoke, and intrusion. For intruder detection, they use the Haar-cascade classifier to detect persons. For fire detection, they use only M2 gas sensors to detect fire and make alerts in any circumstances of these types. In [10] journal paper the author trained a model for Intrusion and Burglary Detection using Fuzzy Technique and alerted the owner by short messaging service in the real-time scenario. The design approach combines the acquisition of vibration signal obtained from the burgles/intruder(s) by microcontroller-based accelerometer, intrusion detection logic built on the Fuzzy Inference System installed and configured on a cloud infrastructure with an alerting system which communicates on a real-time basis to the appropriate authorities of an intrusion/burglary. In [11] proposed research paper Reuben F proposed a system for a smart parking system, Intrusion detection and fire detection system with using an image processing technique with the help of a convolutional neural network (CNN) which collects several frames as input. After getting frames from video it will be processed using image processing techniques for feature evaluation. They extract different features from those images regardless of the events they consist of. Similarly, in [12] the proposed approach defines a complete system to detect both instance and complex events when performing emergency alerting in scenarios, such as smart cities and industry, defining a comprehensive mechanism to distributively detect emergencies and to notify any requesting emergency-based application. In this system, they used the OPEN CV algorithm and techniques with different types of sensors to build up the accuracy rate of the existing system. In proposed paper designs a smart home system in which they include a security system with theft detection and sensor-based fire detection with the help of different sensors. This project is based on IoT-based sensors and includes a Google assistant device to operate the system by voice command. Voice commands control home electronic devices (lights), while fire and theft are monitored through the use of sensors and cameras. The system test shows that voice commands can control lights on and off at an accuracy of 88%. Similarly, in this proposed paper smart home and security system was introduced which automates the electronic appliances of the house and proposes a base security system using different sensors to secure the house sensors including a PIR motion detector sensor and camera for person detection. In research paper presents a fuzzy model for early fire detection and control as symmetry's core contribution to fuzzy systems design and application in computer and engineering sciences. We utilize a fuzzy logic technique to simulate the performance of the model using MATLAB, using six parameters: temperature, humidity, flame, CO, CO2 and O2 vis-à-vis the Estimated Fire Intensity Prediction (EFIP). Results show that using fuzzy logic, a significant improvement in fire detection is observed with an overall accuracy rate of 95.83%. In research paper uses IoT sensor-based technology to detect theft and fire and alert in a real-time environment Simultaneously, the buzzer alerts the nearby neighbors. The system also consists of a sprayer, which sprays the chloroform liquid on the intruders and the sprinkler discharges water when the effect of the fire has been detected. In proposed system is used to automate the home and integrated with a security system to save the home from theft. This paper used multiple sensors like MQ2, flame sensor, smoke sensor, moisture sensor and other sensors to automate home and alert about any alarming situation.

Comparison Chart:

S.NO	Author Name		Fire safety			Theft Detection		Voice Assistance	Temperature Control
		Year	Temperature Sensor	Smoke Sensor	Image Processing	Motion Detection	Image Processing		
1	PROPOSED SYSTEM		✓	✓	✓	✓	✓	✓	✓
2	Oussama Tahan	2020	X	X	X	✓	✓	X	X
3	Akihiko Iketani	2020	X	X	X	X	✓	X	X
4	Adnan Khalil	2020	X	X	✓	X	X	X	X
5	L. Mary Gladencel	2020	X	X	X	X	X	✓	✓
6	Wen Wang	2020	X	X	✓	X	X	X	X
7	Mahmud, S.	2019	X	X	X	✓	✓	✓	X
8	Mujahid Tabassum	2020	X	✓	X	X	✓	X	✓
9	Isah Mohammed	2020	X	X	X	✓	✓	X	X
10	F. Tribhuwan	2020	X	X	✓	X	✓	X	X
11	Daniel G. Costa	2020	X	✓	✓	X	X	X	X
12	Agus Nurcahyo	2020	X	✓	X	X	✓	✓	✓
13	Emmanuel Lule	2020	X	X	X	✓	✓	X	✓
14	S. S. V. Reddy	2021	X	✓	X	✓	✓	X	X
15	S. Kumar	2022	✓	✓	X	✓	✓	✓	X
16	P K Singh	2023	X	✓	✓	X	✓	✓	X

4. Problem Statement

Security perspective: Fire and theft are two major security and safety hazards in markets. A recent fire in a market in the UAE damaged 125 shops and destroyed millions of dollars' worth of goods. This shows the importance of having effective security measures in place to prevent and mitigate these risks.

Life-saving: In the event of a fire, people need to be able to evacuate the building quickly and safely. If people are not able to leave the building or are not guided to an emergency exit, this can result in the loss of human life. Therefore, it is important to have clear and visible signage and evacuation procedures in place.

5. Aim & Objectives

The primary goal of a good security system in a market is to increase safety. This can be done by reducing the time it takes to act against fires and notifying the fire department as soon as possible. A security system that can quickly notify the security department and deceive thieves and criminals is also essential. The use of voice assistant technology to assist and guide shoppers in the market is another important step.

- Decreasing the time, it takes to act against fires: A good fire detection system will be able to detect fires early on, giving people time to evacuate the building safely. The system should also be able to notify the fire department quickly so that they can arrive on the scene as soon as possible.

- Notifying the security department quickly: A security system should be able to quickly notify the security department of any suspicious activity. This can help to deter crime and catch criminals.
- Deceiving thieves and criminals: A security system should be designed to make it difficult for thieves and criminals to operate. This can be done by using security cameras, alarms, and other security measures.
- Using voice assistant technology to assist and guide shoppers: Voice assistant technology can be used to provide directions to customers, answer questions about the market, and report suspicious activity to security personnel. This can help to improve the safety of the market and make it easier for people to find what they need.

6. Methodology

Phase-1

This phase involves understanding the needs of the people who will be using the system, as well as the challenges that they face. For example, people need to feel safe in a mall, and they need to be able to shop without worrying about theft or fire.

Phase-II

This phase involves designing and implementing the three modules: the fire module, the theft detection module, and the voice assistance module. Each module must be coded separately and then connected to the other modules on a single platform. The fire module must be able to detect fires early on and send an alert to the security personnel. The theft detection module must be able to detect people stealing items from the mall and send an alert to the security personnel. The voice assistance module must be able to understand voice commands and respond to them.

Phase-III

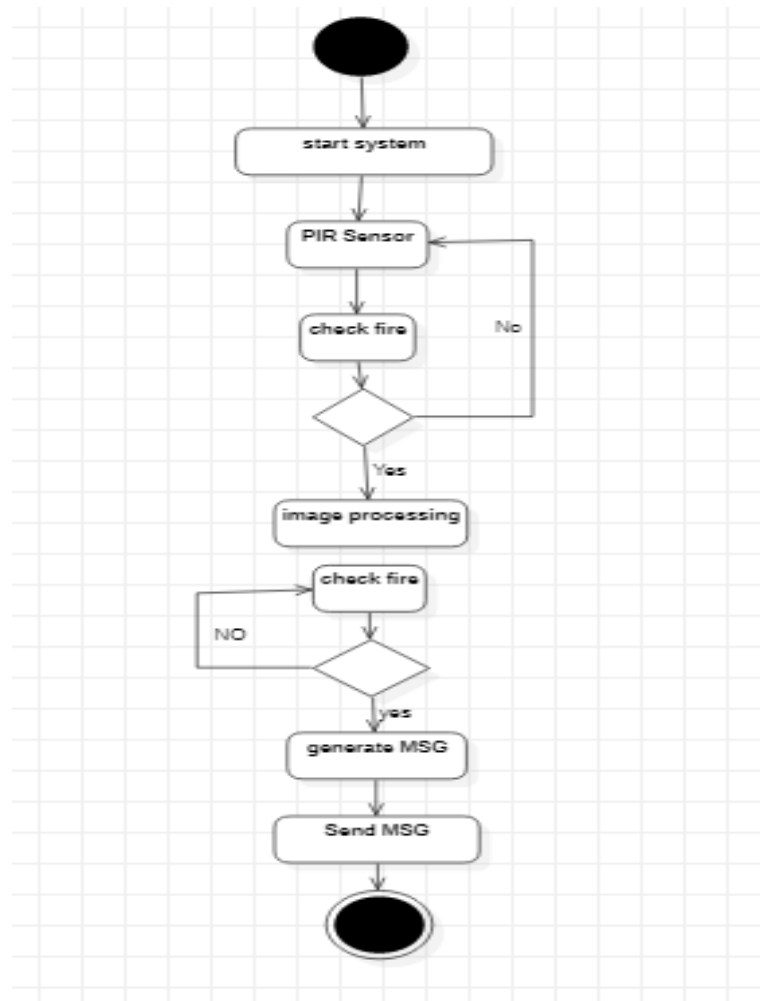
This phase involves testing the hardware and software components to make sure that they are working properly and that they are able to communicate with each other. The system must also be tested to make sure that it is able to detect fires, theft, and voice commands. The testing team should use a variety of tests to make sure that the system is working as expected.

Phase-IV

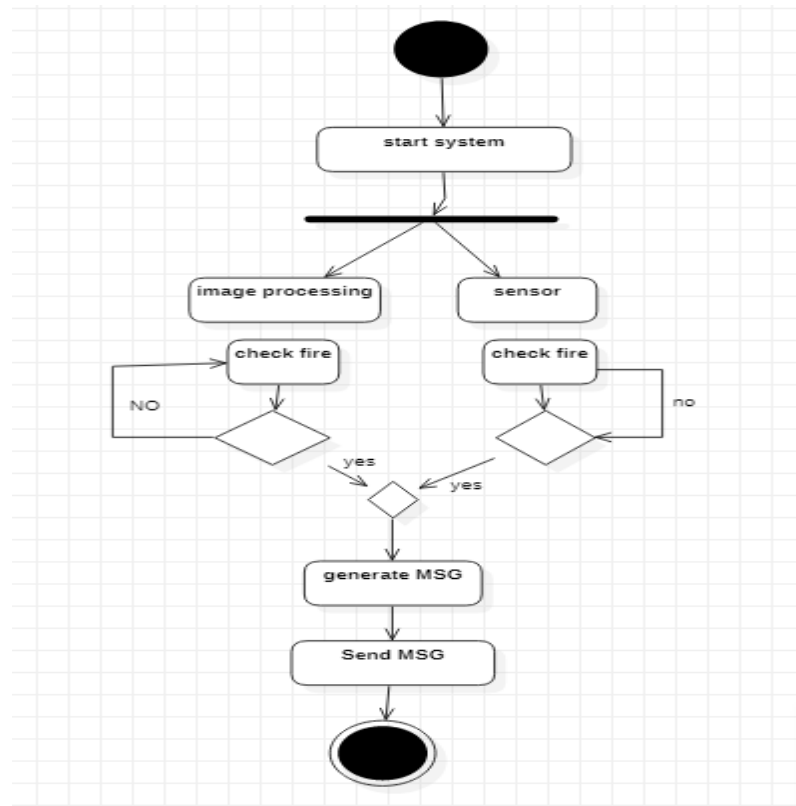
This phase involves installing the system in the mall and training the security personnel on how to use it. The system must also be monitored to make sure that it is working properly. The security personnel should be trained on how to use the system and how to respond to alarms and alerts.

Phase-V

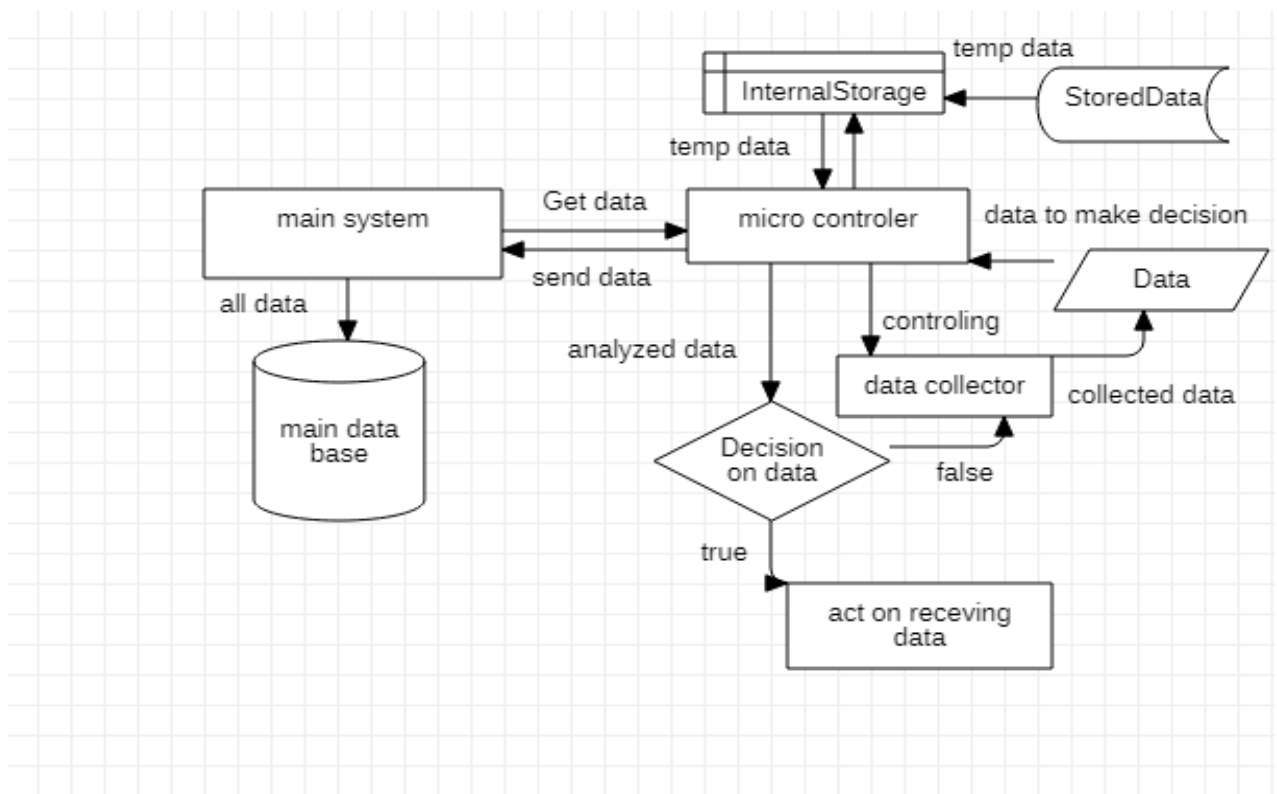
We have our own database, which is temporary. The database collects the data of our micro controller. Live camera video will be saved in the database for two days, after which the film will be automatically deleted. Data is collected from the sensors and sent to the micro-controller through the data collector. If any unusual activity is discovered, the micro-controller will communicate it and GSM act on receiving data.



DFD of Fire detection (fig.6.1.1)



DFD of Theft detection (fig.6.1.2)



Architecture Diagram (fig.6.2)

7. Conclusion

This project proposes a real-time solution to market security and safety concerns. It introduces a fire alarm system and security system to ensure market security. In the past, many stores in the market have been robbed, and thieves have easily escaped with millions of rupees. In this case, the smart market safety and security system would detect movements and send an alarm message to the market security agencies. In some cases, fire information was not received promptly, resulting in numerous casualties and economic losses.

8. Future Direction

In the future, we can add new features to the system, such as face mask detection and people counting. Other future system extensions or enhancements for the real-time shopping mall safety and security system include:

Face mask detection: This feature can be added to know that who is entering the shopping mall wearing face masks

People counting: This feature can be used to ensure that the number of people entering the shopping mall at a time does not exceed the maximum capacity.

Fire module: The image processing technique used in the fire module can be improved to get more accurate and reliable results. Multiple automatic fire extinguishers can also be installed to start spraying on fire when the camera detects it.

Robbery detection module: More sensors can be used to enhance the security of the shopping mall. Gesture detection and object detection algorithms can also be implemented to improve the robbery detection module.

Voice assistant system: The voice assistant system can be enhanced by making it more secure and reliable. Speaker verification and ID can be used to ensure that only authorized users can access the system.

These are just a few ideas for future system extensions or enhancements for the real-time shopping mall safety and security system. By adding these features, the system can be made even more effective in protecting people and property.

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Section 10: (For office use only)

Forwarded by: _____

Submission Date: _____

FYP Project Committee Leader

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Approved / Rejected by:

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Project Number: _____ Date of Approval / Rejection: _____

Comments (if any): _____
